

Attendance Problems.

1. If $\triangle QRS \cong \triangle ZYX$, identify the pairs of congruent angles and the pairs of congruent sides.

Solve each proportion.

2. $\frac{2}{x-3} = \frac{8}{3x-3}$

3. $\frac{x-6}{42} = \frac{2x-14}{77}$

- I can identify similar polygons.
- I can apply properties of similar polygons to solve problems.

Vocabulary		
similar	similar polygons	similarity ratio

Common Core

CC.9-12.G.SRT.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding angles and the proportionality of all corresponding pairs of sides.

CC.9-12.G.MG.3 Apply geometric methods to solve design problems. . .

Q: What does the zero say to the eight?

A: Nice belt!

"Beauty seen makes the one who sees it more beautiful"

Author, David Steindl-Rast

Figures that are **similar** (\sim) have the same shape but not necessarily the same size.



$\triangle 1$ is similar to $\triangle 2$ ($\triangle 1 \sim \triangle 2$).

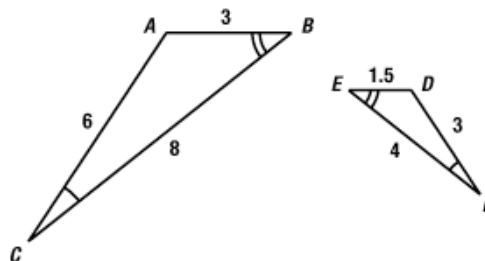


$\triangle 1$ is not similar to $\triangle 3$ ($\triangle 1 \not\sim \triangle 3$).

Similar Polygons

DEFINITION	DIAGRAM	STATEMENTS
Two polygons are similar polygons if and only if their corresponding angles are congruent and their corresponding side lengths are proportional.	<p>$ABCD \sim EFGH$</p>	$\angle A \cong \angle E$ $\angle B \cong \angle F$ $\angle C \cong \angle G$ $\angle D \cong \angle H$ $\frac{AB}{EF} = \frac{BC}{FG} = \frac{CD}{GH} = \frac{DA}{HE} = \frac{1}{2}$

Refer to video Example 1. Identify the pairs of congruent angles and corresponding sides.



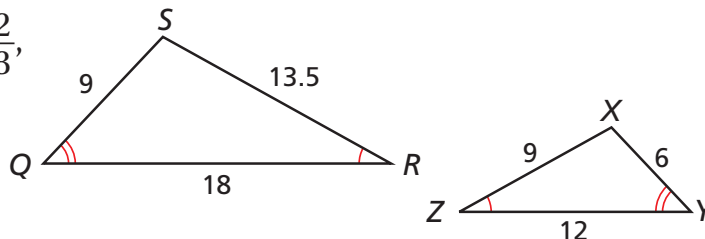
1 Describing Similar Polygons

Identify the pairs of congruent angles and corresponding sides.

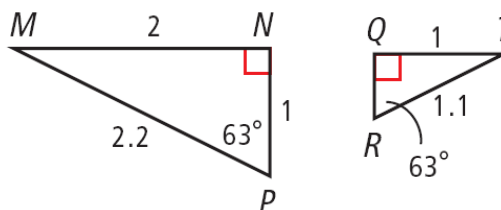
$\angle Z \cong \angle R$ and $\angle Y \cong \angle Q$. By the Third Angles Theorem, $\angle X \cong \angle S$.

$$\frac{XY}{SQ} = \frac{6}{9} = \frac{2}{3}, \frac{YZ}{QR} = \frac{12}{18} = \frac{2}{3},$$

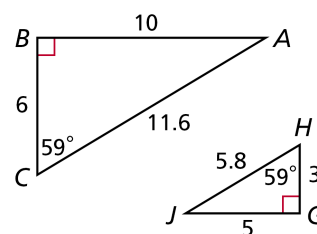
$$\frac{XZ}{SR} = \frac{9}{13.5} = \frac{2}{3}$$



Example 1: Identify the pairs of congruent angles and corresponding sides.

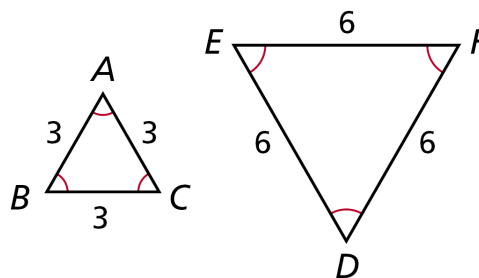


11. Guided Practice: Identify the pairs of congruent angles and corresponding sides:



A **similarity ratio** is the ratio of the lengths of the corresponding sides of two similar polygons.

- The similarity ratio of $\triangle ABC$ to $\triangle DEF$ is $\frac{3}{6}$, or $\frac{1}{2}$.
- The similarity ratio of $\triangle DEF$ to $\triangle ABC$ is $\frac{6}{3}$, or 2.

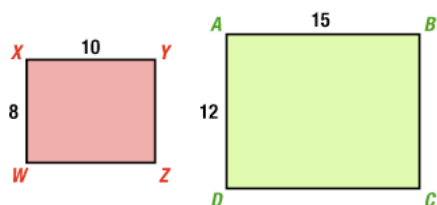


Writing Math

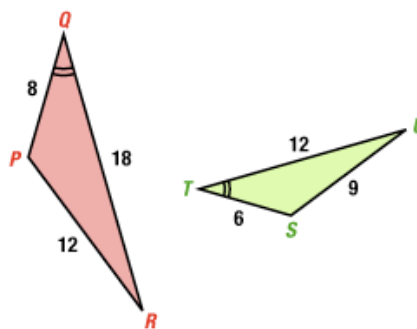
Writing a similarity statement is like writing a congruence statement—be sure to list corresponding vertices in the same order.

Refer to video example 2. Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.

A.



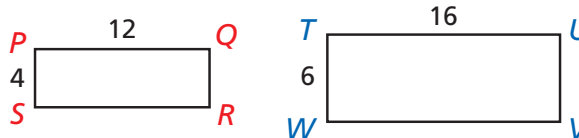
B.



2 Identifying Similar Polygons

Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.

A rectangles $PQRS$ and $TUVW$



Step 1 Identify pairs of congruent angles.

$$\angle P \cong \angle T, \angle Q \cong \angle U,$$

$$\angle R \cong \angle V, \text{ and } \angle S \cong \angle W \quad \text{All } \angle \text{ of a rect. are rt. } \angle \text{ and are } \cong.$$

Step 2 Compare corresponding sides.

$$\frac{PQ}{TU} = \frac{12}{16} = \frac{3}{4}, \quad \frac{PS}{TW} = \frac{4}{6} = \frac{2}{3}$$

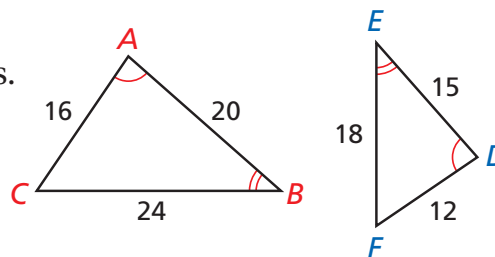
Since corresponding sides are not proportional, the rectangles are not similar.

B $\triangle ABC$ and $\triangle DEF$

Step 1 Identify pairs of congruent angles.

$$\angle A \cong \angle D, \angle B \cong \angle E \quad \text{Given}$$

$$\angle C \cong \angle F \quad \text{Third } \angle \text{ Thm.}$$



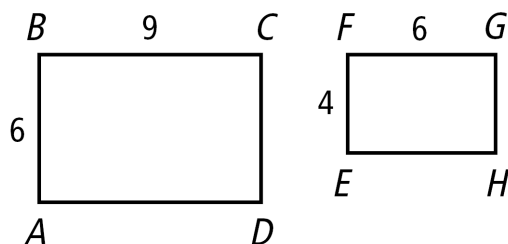
Step 2 Compare corresponding sides.

$$\frac{AB}{DE} = \frac{20}{15} = \frac{4}{3}, \quad \frac{BC}{EF} = \frac{24}{18} = \frac{4}{3}, \quad \frac{AC}{DF} = \frac{16}{12} = \frac{4}{3}$$

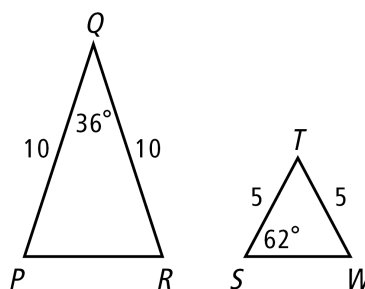
Thus the similarity ratio is $\frac{4}{3}$, and $\triangle ABC \sim \triangle DEF$.

Example 2. Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.

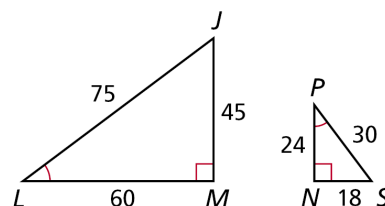
A.



B.



12. Guided Practice: Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.



Helpful Hint

When you work with proportions, be sure the ratios compare corresponding measures.

Refer to video example 3.

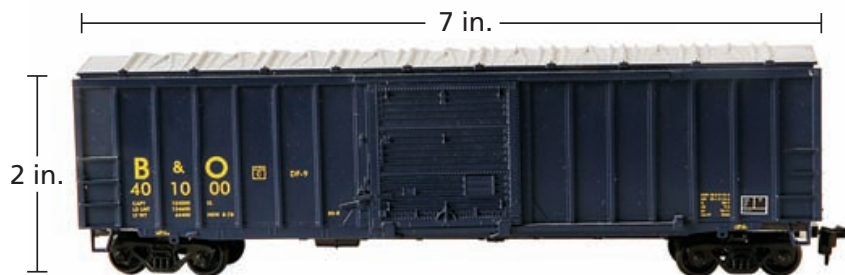
The length of the kitchen in the blueprint is 5.5 inches and the width is 8.75 inches. The actual width of the kitchen is 12.25 feet. Find the actual length of the kitchen.



3 Hobby Application

A Railbox boxcar can be used to transport auto parts. If the length of the actual boxcar is 50 ft, find the width of the actual boxcar to the nearest tenth of a foot.

Let x be the width of the actual boxcar in feet. The rectangular model of a boxcar is similar to the rectangular boxcar, so the corresponding lengths are proportional.



$$\frac{\text{length of boxcar}}{\text{length of model}} = \frac{\text{width of boxcar}}{\text{width of model}}$$

$$\frac{50}{7} = \frac{x}{2}$$

$$7x = (50)(2)$$

$$7x = 100$$

$$x \approx 14.3$$

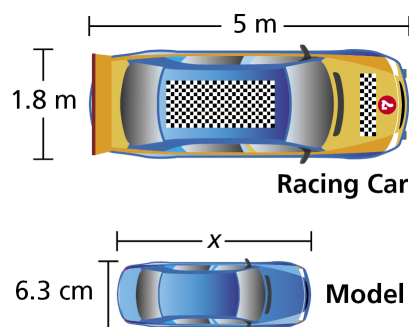
Cross Products Prop.

Simplify.

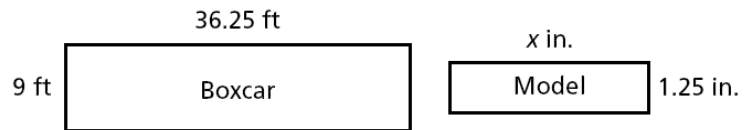
Divide both sides by 7.

The width of the model is approximately 14.3 ft.

Example 3. Find the length of the model to the nearest tenth of a centimeter.



13. Guided Practice: A boxcar has the dimensions shown. A model of the boxcar is 1.25 in. wide. Find the length of the model to the nearest inch.



7-1 Ratios in Similar Polygons (*p* 469) 7-11, 14, 20, 25, 26.

